CLAIMS

What Is Claimed Is:

1. A method of making a plurality of battery plates, the method comprising:

forming a strip of interconnected battery grids from a lead alloy grid material, each interconnected battery grid including a grid network bordered by at least one frame element, the grid network comprising a plurality of spaced apart grid wire elements, each grid wire element having opposed ends, each opposed end being joined to one of a plurality of nodes to define a plurality of open spaces in the grid network;

applying a lead alloy coating to the strip of interconnected battery grids;

applying battery paste to the strip of interconnected battery grids; and

cutting the strip of interconnected battery grids to form a plurality of battery plates.

2. The method of claim 1 further comprising:

deforming at least a portion of the grid wire elements at a position intermediate the opposed ends of the grid wire element before applying the lead alloy coating to the strip of interconnected battery grids such that a first transverse cross-section taken at the position intermediate the opposed ends of the grid wire element differs from a second transverse cross-section taken at one of the opposed ends of the grid wire element.

3. The method of claim 2 wherein the step of deforming at least a portion of the grid wire elements comprises:

stamping the grid wire element at the position intermediate the opposed ends of the grid wire element.

4. The method of claim 3 wherein:

the grid network and each of the frames define opposed substantially

planar surfaces, and each first transverse cross-section does not extend beyond the planar surfaces.

5. The method of claim 1 wherein the step of forming a strip of interconnected battery grids from a grid material comprises:

feeding a continuous strip of the grid material along a linear path aligned with the longitudinal direction of the strip; and

punching grid material out of the strip to form the strip of interconnected battery grids.

6. The method of claim 5 wherein:

the continuous strip of the grid material is formed by a continuously casting a melt of the lead alloy grid material.

7. The method of claim 5 wherein:

the continuous strip of the grid material is formed by a casting a melt of the lead alloy grid material to form a slab and rolling the slab.

8. The method of claim 5 further comprising:

deforming at least a portion of the grid wire elements at a position intermediate the opposed ends of the grid wire element before applying the lead alloy coating to the strip of interconnected battery grids such that a first transverse cross-section taken at the position intermediate the opposed ends of the grid wire element differs from a second transverse cross-section taken at one of the opposed ends of the grid wire element.

9. The method of claim 1 wherein the step of forming a strip of interconnected battery grids from a grid material comprises:

feeding a continuous strip of the grid material along a linear path aligned with the longitudinal direction of the strip;

forming slits in the strip of grid material; and

laterally expanding the strip of grid material to form the strip of interconnected battery grids.

10. The method of claim 9 further comprising:

deforming at least a portion of the grid wire elements at a position intermediate the opposed ends of the grid wire element before applying the lead alloy coating to the strip of interconnected battery grids such that a first transverse cross-section taken at the position intermediate the opposed ends of the grid wire element differs from a second transverse cross-section taken at one of the opposed ends of the grid wire element.

11. The method of claim 1 wherein the step of forming a strip of interconnected battery grids from a grid material comprises:

melting the grid material; and

continuously casting the grid material to form the strip of interconnected battery grids.

12. The method of claim 11 further comprising:

deforming at least a portion of the grid wire elements at a position intermediate the opposed ends of the grid wire element before applying the lead alloy coating to the strip of interconnected battery grids such that a first transverse cross-section taken at the position intermediate the opposed ends of the grid wire element differs from a second transverse cross-section taken at one of the opposed ends of the grid wire element.

13. The method of claim 1 wherein the step of applying a lead alloy coating to the strip of interconnected battery grids comprises:

immersing the strip of interconnected battery grids in a melt of the lead alloy coating.

14. The method of claim 13 wherein the step of applying a lead alloy

coating to the strip of interconnected battery grids further comprises:

introducing a gas into the melt of the lead alloy coating while immersing the strip of interconnected battery grids in the melt of the lead alloy coating.

15. The method of claim 13 wherein the grid material comprises a lead-calcium alloy and the coating comprises a lead-tin alloy.

16. The method of claim 15 wherein the lead-tin alloy comprises about 90 wt. % to about 99 wt. % lead and about 1 wt. % to about 10 wt. % tin.

17. The method of claim 15 wherein the lead-tin alloy further includes antimony.

18. The method of claim 17 wherein the lead-tin alloy comprises about 80 wt. % to about 98 wt. % lead, about 1 wt. % to about 10 wt. % tin, and about 1 wt. % to about 10 wt. % antimony.

19. The method of claim 1 wherein the step of applying a lead alloy coating to the strip of interconnected battery grids comprises:

spraying a melt of the lead alloy coating on the strip of interconnected battery grids.

20. The method of claim 1 further comprising:

quenching the strip of interconnected battery grids in a fluid bath after applying the lead alloy coating to the strip of interconnected battery grids and before applying battery paste to the strip of interconnected battery grids.

21. The method of claim 1 further comprising:

age hardening the strip of interconnected battery grids at an elevated temperature after quenching the strip of interconnected battery grids and before applying battery paste to the strip of interconnected battery grids.

22. A method of making a plurality of battery plates, the method comprising:

melting a lead alloy grid material;

continuously casting the grid material to form a continuous strip;

punching grid material out of the strip to form interconnected battery grids, each interconnected battery grid including a grid network bordered by a frame, the frame having a current collector lug, the grid network comprising a plurality of spaced apart grid wire elements, each grid wire element having opposed ends, each opposed end being joined to one of a plurality of nodes to define a plurality of open spaces in the grid network;

applying a lead alloy coating to the interconnected battery grids;

applying battery paste to the interconnected battery grids; and

cutting the interconnected battery grids to form a plurality of battery plates.

23. The method of claim 22 wherein the step of applying a lead alloy coating to the interconnected battery grids comprises:

immersing the interconnected battery grids in a melt of the lead alloy coating.

24. The method of claim 23 wherein the step of applying a lead alloy coating to the strip of interconnected battery grids further comprises:

introducing a gas into the melt of the lead alloy coating while immersing the strip of interconnected battery grids in the melt of the lead alloy coating.

25. The method of claim 22 wherein the grid material comprises a lead-calcium alloy and the coating comprises a lead-tin alloy.

26. The method of claim 25 wherein the lead-tin alloy comprises about 90 wt. % to about 99 wt. % lead and about 1 wt. % to about 10 wt. % tin.

27. The method of claim 25 wherein the lead-tin alloy further includes antimony.

28. The method of claim 27 wherein the lead-tin alloy comprises about 80 wt. % to about 98 wt. % lead, about 1 wt. % to about 10 wt. % tin, and about 1 wt. % to about 10 wt. % antimony.

29. The method of claim 22 further comprising:

stamping at least a portion of the grid wire elements at a position intermediate the opposed ends of the grid wire element before applying the lead alloy coating to the interconnected battery grids such that a first transverse cross-section taken at the position intermediate the opposed ends of the grid wire element differs from a second transverse cross-section taken at one of the opposed ends of the grid wire element.

30. The method of claim 22 further comprising:

quenching the interconnected battery grids in a fluid bath after applying the lead alloy coating to the interconnected battery grids and before applying battery paste to the interconnected battery grids.

31. The method of claim 22 further comprising:

age hardening the interconnected battery grids at an elevated temperature after quenching the interconnected battery grids and before applying battery paste to the interconnected battery grids.

32. A method of making a plurality of battery grids, the method comprising:

forming a strip of interconnected battery grids from a lead alloy grid material, each interconnected battery grid including a grid network bordered by at least one frame element, one of the frame elements having a current collector lug, the grid network comprising a plurality of spaced apart grid wire elements, each

grid wire element having opposed ends, each opposed end being joined to one of a plurality of nodes to define a plurality of open spaces in the grid network;

applying a lead alloy coating to the strip of interconnected battery grids; and

cutting the strip to form a plurality of battery grids.

33. The method of claim 32 further comprising:

deforming at least a portion of the grid wire elements at a position intermediate the opposed ends of the grid wire element before applying the lead alloy coating to the strip of interconnected battery grids such that a first transverse cross-section taken at the position intermediate the opposed ends of the grid wire element differs from a second transverse cross-section taken at one of the opposed ends of the grid wire element.

34. The method of claim 33 wherein the step of deforming at least a portion of the grid wire elements comprises:

stamping the grid wire element at the position intermediate the opposed ends of the grid wire element.

35. The method of claim 32 wherein the step of forming a strip of interconnected battery grids from a grid material comprises:

feeding a continuous strip of the grid material along a linear path aligned with the longitudinal direction of the strip; and

punching grid material out of the strip to form the strip of interconnected battery grids.

36. The method of claim 32 wherein:

the continuous strip of the grid material is formed by a continuously casting a melt of the lead alloy grid material.

37. The method of claim 32 wherein the step of applying a lead alloy

coating to the strip of interconnected battery grids comprises:

immersing the strip of interconnected battery grids in a melt of the lead alloy coating.

38. The method of claim 37 wherein the step of applying a lead alloy coating to the strip of interconnected battery grids further comprises:

introducing a gas into the melt of the lead alloy coating while immersing the strip of interconnected battery grids in the melt of the lead alloy coating.

39. A grid for a battery comprising:

a grid network bordered by at least one frame element, one of the frame elements having a current collector lug,

the grid network comprising a plurality of spaced apart grid wire elements, each grid wire element having opposed ends, each opposed end being joined to one of a plurality of nodes to define a plurality of open spaces,

the grid network being coated on substantially all surfaces with a lead alloy coating;

at least a portion of the grid wire elements having a first transverse cross-section taken at a position intermediate the opposed ends of the grid wire element that differs from a second transverse cross-section taken at one of the opposed ends of the grid wire element.

40. The grid of claim 39 wherein:

the second transverse cross-section is substantially rectangular.

41. The grid of claim 39 wherein:

the first transverse cross-section substantially has a shape selected from group consisting of diamond, oval, rhomboid, hexagon, and octagon.

42. The grid of claim 39 wherein the lead alloy coating is porous.